68217

S/078/60/005/02/003/045
B004/B016

Synthesis of Tantalum- and Niobium Iodides by Interaction of $TaCl_5$ and $NbCl_5$ With Al_2J_6 and SiJ_4

M. I. Kalinin)

SUBMITTED: September 17, 1958

Card 3/3

NISEL'SON, L.A.; SEMYAKOV, G.V.

Systems: $SiCl_4 - PCl_3$, $SiCl_4 - POCl_3$, and $SiCl_4 - PCl_5$.
Zhur.neorg.khim. 5 no.5:1139-1145 My '60. (MIRA 13:7)

1. Moskovskiy institut tsvetnykh metallov im. M.I.Kalinina.
(Silicon chloride) (Phosphorus chloride)
(Phosphoryl chloride)

S/078/60/005/007/035/043/XX
B004/B060

AUTHORS: Nisel'son, L. A., Chernyayev, V. N.

TITLE: SiI_4 - BI_3 and SiI_4 - Al_2I_6 Systems

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 7, pp. 1564-1566

TEXT: In view of the fact that volatile iodides are used to produce high-purity elements, the authors examined the phase equilibria in the SiI_4 - BiI_3 and SiI_4 - Al_2I_6 systems. The phase equilibrium between crystals and liquid was determined by a method described in Ref. 1, and the boiling point according to Ref. 2 at 760 torr. Results are given in Tables 1,2 and in Figs. 1,2.

Card 1/4

SiI_4 - BI_3 and SiI_4 - Al_2I_6 Systems

S/078/60/005/007/035/043/XX
B004/B060

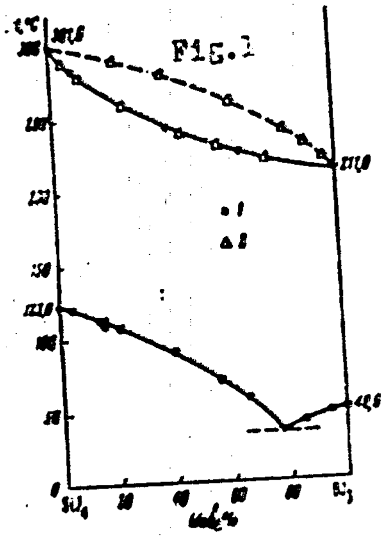


Fig.1

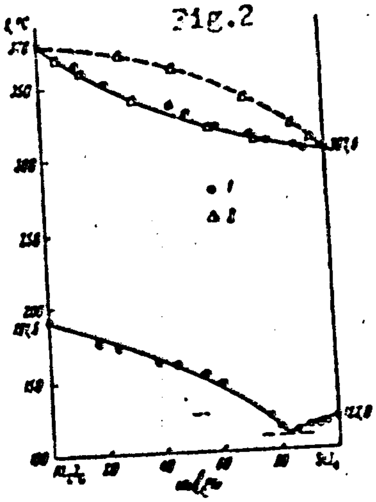


Fig.2

Card 2/4

SiI_4 - BI_3 and SiI_4 - Al_2I_6 Systems

S/071/60/005/007/035/043/XX
B004/B060

Eutectics appear in both systems. A linear dependence was found between the logarithm of the molar SiI_4 fraction and the reciprocal value of absolute temperature. The thermal effects calculated from the tangent of this straight line lie near the melting heats of SiI_4 and Al_2I_6. The systems, therefore, follow the Schröder equation. The Raoult law holds for both systems. This was confirmed by measuring the pressure of saturated vapor of pure SiI_4. Table 3 gives the boiling points of Al_2I_6 between 148 and 854.5 torr, and of SiI_4 between 105.5 and 880.0 torr, determined by means of a Sventoslavskiy ebulliometer. The authors point to the possibility of calculating the phase equilibrium between liquid and vapor from the data relative to the phase equilibrium crystal - liquid, and vice versa, on the basis of the activity coefficients, provided the system does not deviate too much from an ideal one. There are 2 figures, 3 tables, and 2 references: 1 Soviet, 1 US, and 1 German.

SUBMITTED: March 12, 1959

Card 3/4

SiI_4 - BI_3 and SiI_4 - Al_2I_6 Systems

S/078/60/005/007/035/043/XX
B004/B060

Legend to Fig. 1: Phase equilibria in the SiI_4 - BiI_3 system
Legend to Fig. 2: Phase equilibria in the SiI_4 - Al_2I_6 system

To both Figs.: 1) points determined experimentally
2) calculated by Raoult's equation

Card 4/4

NISEL'SON, L.A.

Interaction between $NbCl_5$ and $PSCl_3$, and between $TaCl_5$ and $PSCl_3$. Zhur.neorg.khim. 5 no.7:1634 Jl '60. (MIRA 13:7)

(Niobium chloride) (Thallium chloride)
(Thiophosphoryl chloride)

S/078/60/005/009/018/040/XX
B017/B058

AUTHORS: Ivanov - Emin, B. N. and Nisel'son, L. A.

TITLE: Amphoteric Properties of Ytterbium and Lutecium Hydroxides

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 9, pp. 1921 - 1923

TEXT: The alkali salts of the hexahydroxo compounds of ytterbium and lutecium were synthetized. Ytterbium and lutecium oxides with a purity of 99.95% were used as starting materials. The amphoteric hydroxides were treated with a concentrated sodium hydroxide solution for 48 hours in an autoclave at 180 - 200°C. The isolated compounds have the following composition:

$$Na_3\left[Yb(OH)_6\right] \quad \text{and} \quad Na_3\left[Lu(OH)_6\right].$$

Card 1/2

Amphoteric Properties of Ytterbium and Lutecium Hydroxides

S/078/60/005/009/018/040/XX
B017/B058

The hydroxo compounds of ytterbium and lutecium decompose in water to form sodium hydroxide and the corresponding hydroxides. Through heat treatment of the hydroxo compounds of ytterbium and lutecium at 320 - 350°C, these compounds lose two water molecules. Sodium meta-ytterbiate $NaYbO_2$ and sodium meta-luteciate $NaLuO_2$ are produced by heating equivalent mixtures of the corresponding lanthanide oxides with Na_2CO_3 at 900°C. There are 2 figures, 1 table, and 6 references: 2 Soviet, 3 German, and 1 Czechoslovakian.

√

SUBMITTED: June 19 1959

Card 2/2

42277

S/078/60/005/009/028/040/XX
B017/B058

11.4100

AUTHORS: Ivanov-Emin, B. N., Nisel'son, L. A., Larionova, L. Ye.

TITLE: Study of the Behavior of Some Fluoro Gallates of Alkali Metals in Aqueous Solutions

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 9, pp. 1993-1995

TEXT: The fluoro gallates of potassium, rubidium and cesium were studied in aqueous phase by means of electrical conductivity measurements. The molecular electrical conductivities found for the compounds $[GaF_3 \cdot 3H_2O]$, $K_2[GaF_5 \cdot H_2O]$, $Rb[GaF_4 \cdot 2H_2O]$ and $Cs[GaF_4 \cdot 2H_2O]$ are given in Fig. 1 and Table 1. The determination was made at 20°C. It follows from the studies of the conductivity of fluoro gallates of potassium rubidium and cesium that the complex anion decomposes in aqueous solution according to the reaction scheme: $K_2[GaF_5 \cdot H_2O] \rightarrow 2\ KF + GaF_3 + H_2O$ and $Cs[GaF_4 \cdot 2H_2O] \rightarrow CsF + GaF_3 + H_2O$,

Card 1/2

85599

Study of the Behaviour of Some Fluoro S/078/60/005/009/028/040/XX
Gallates of Alkali Metals in Aqueous Solutions B017/B058

respectively. When diluting the gallium fluoride solutions, hydration and dissociation of the hydrated gallium fluoride molecule sets in according to the reaction scheme: $[GaF_3 \cdot 3H_2O] + H_2O \rightarrow [GaF_2 \cdot 4H_2O]^+ + F^-$. The dissociation rises slowly with increasing dilution and the molecular conductivity attains the valence of a two-ion electrolyte only at a dilution of $V \approx 700$ - 1000l/mole. The authors mention I. V. Tananayev and N. V. Bausova. There are 1 figure, 2 tables, and 5 references: 4 Soviet and 1 British.

SUBMITTED: June 6, 1959

Card 2/2

S/078/60/005/009/022/040/XX
B017/B058

AUTHORS: Ivanov-Emin, B. N., Nisel'son, L. A., Greksa, Ya.

TITLE: Study of the Solubility of Indium Hydroxide in Sodium Hydroxide Solutions

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 9, pp. 1996-1998

TEXT: The solubility of indium hydroxide in sodium hydroxide solutions with concentrations of from 1 to 17 mol/l was studied at 25°C. Indium hydroxide was prepared according to the method by N. A. Tananayev (Ref. 6) and subsequently converted into the crystalline state according to the method by Fricke and Seitz (Ref. 7). The analysis results of crystalline indium hydroxide, dried at 120°C, corresponded to formula $In(OH)_3$. The solubility of indium hydroxide in solutions of sodium hydroxide at 25°C is given in Table 1, and Fig. 1 shows graphically the dependence of the solubility of indium hydroxide at 25°C on the concentration of sodium

Card 1/2

Study of the Solubility of Indium Hydroxide in Sodium Hydroxide Solutions

S/078/60/005/009/029/040/XX
B017/B058

hydroxide. The maximum solubility of $In(OH)_3$ in sodium hydroxide solutions (11.35 mol NaOH/l) amounts to 11.0 g/l. The solid phase consists of indium hydroxide at a soda lye concentration of up to 11.0 g/l. and of a hydrate of sodium hexahydroxo indate at a soda lye concentration above 11.0 g/l. The solubility of amorphous and crystalline indium hydroxide is the same. The authors mention E. A. Ostroumov, N. V. Aksel'rud, V. B. Spivakovskiy, E. N. Deychman, V. P. Chalyy and S. P. Rozhenko. D. Okhodnitski and Ya. Chizhniar participated in the study. There are 1 figure, 1 table, and 8 references: 6 Soviet, 1 French, and 1 German.

SUBMITTED: June 6, 1959

Card 2/2

S/078/60/005/012/015/016
B017/B064

AUTHORS: Ivanov-Emin, B. N., Nisel'son, L. A., Ivolgina, A. T.

TITLE: Study of the Solubility of Scandium Hydroxide in Sodium Hydroxide Solutions

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 12, pp. 2841-2842

TEXT: The solubility of scandium hydroxide in sodium hydroxide solutions containing 1 - 19 moles of NaOH/l was studied at 25°C. Maximum solubility of $Sc(OH)_3$ in an 11.7-mole solution of sodium hydroxide is 5.0 g/l. The existence of peaks on the solubility curve indicates the formation of sodium hydroxo scandiate. The solid phase up to the peak is crystalline scandium hydroxide, and the solid phase behind the peak is a hydrate of sodium hexahydroxo scandiate $Na_3[Sc(OH)_6]\cdot 2H_2O$. N. A. Tananayev is mentioned. There are 1 figure, 1 table, and 9 references: 4 Soviet, 2 British, 2 German, and 1 Czechoslovakian.

SUBMITTED: December 30, 1959

Card 1/1

S/080/60/033/008/005/013
A003/A001

AUTHORS: Nisel'son, L.A., Sokolova, T.D.

TITLE: An Investigation of the Kinetics of Interaction Between the Higher Oxides of Tantalum, Niobium, Titanium and Zirconium and Phosphorus Pentachloride

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol.33, No. 8, pp. 1755-1765

TEXT: The kinetics of chlorination of higher oxides of tantalum, niobium, titanium and zirconium with liquid phosphorus pentachloride was studied. The investigation was based on the assumptions 1) that chlorination in the condensated phase causes only a slight change in the concentration of the chlorinating agent; 2) that the experimental arrangement of the investigation is easy; 3) that chlorination products are obtained which can be used for the separation and purification of zirconium, tantalum and niobium by the rectification method. The results obtained in the experiments, presented in the form of a relation between the logarithm of oxide chlorination rate and the inverse absolute temperature of chlorination, obey in all cases the linear law. This proves that in the temperature interval studied (150-300°C) the chlorination processes take place in the kinetic region, i.e., the rate of the process is determined by the rate of the

Card 1/2

S/080/60/033/008/005/013
A003/A001

An Investigation of the Kinetics of Interaction Between the Higher Oxides of Tantalum, Niobium, Titanium and Zirconium and Phosphorus Pentachloride

chemical interaction. Based on the tangents of the inclination angles of the curves obtained the activation energies of the process were calculated. The values obtained vary within the narrow limits of 25-33 kcal/mole and change little at the transition from one oxide to the other. For zirconium dioxide the activation energy is 11.0 kcal/mole, but the reproducibility of the results is low. The chlorination rate of oxides in relation to the weight unit (in g/g·min) depends mainly on the temperature of their preliminary calcination. The principal cause of the change in the oxide chlorination rate in this case is the change of their specific surface. The character of the modification of the oxides studied has only a slight effect on the chlorination rate. The chlorination rate of γ-Nb_2O_5 (calcinated at 800°C) differs from that of α-Nb_2O_5 by only 1.3 times, whereas for the same monoclinic modification of zirconium dioxide, but calcinated at 600 and 800°C the chlorination rates differ by a factor of 5.6. There are 6 figures, 1 table and 18 references: 12 Soviet, 2 American, 2 French, 1 English and 1 German.

SUBMITTED: December 21, 1959

Card 2/2

S/076/60/034/007/016/042/XX
B004/B0[illegible]8

AUTHOR: Nisel'son, L. A.

TITLE: Classification of Separation Techniques

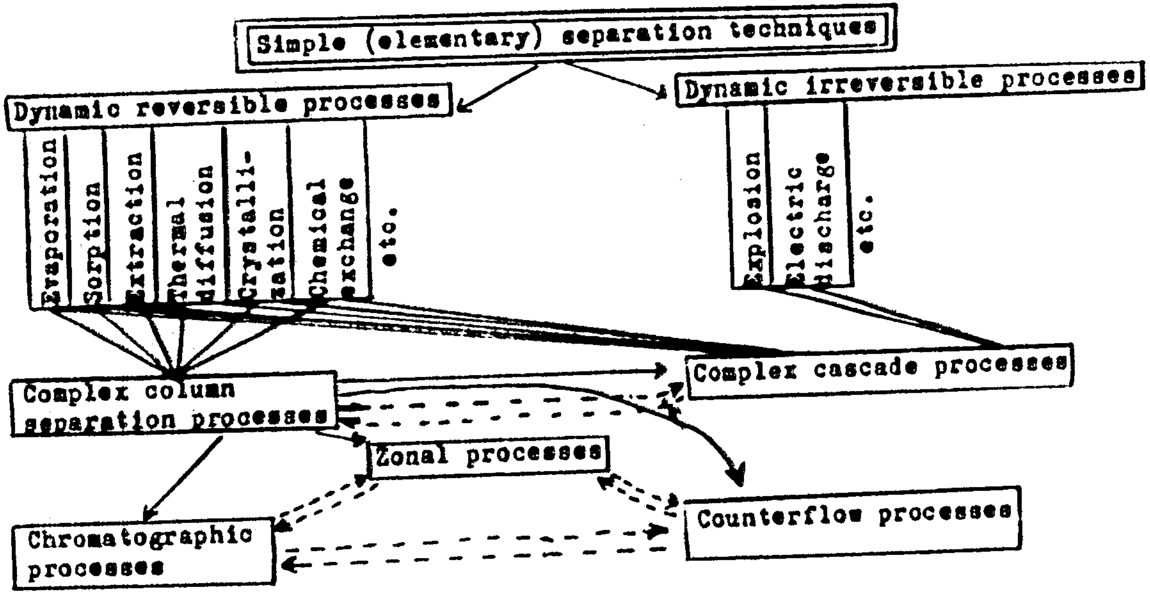
PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 7, pp. 1460-1469

TEXT: This paper is an attempt to classify complex separation techniques according to the different dynamics of material flow of the components to be separated. The concepts of "dynamically reversible" and "dynamically irreversible" elementary processes are introduced. The material flow of three column processes is discussed in more detail, i.e., 1) counterflow; 2) zonal flow; and 3) chromatographic processes. These three processes are types of limiting cases. Multistage column processes may consist of combinations of these types. Transitions from one type to another are possible. A classification scheme is suggested:

Card 1/3

Classification of Separation Techniques

S/076/60/034/007/016/042/XX
B004/B068



Card 2/3

Classification of Separation Techniques

S/076/60/034/007/016/042/XX
B004/B068

On the basis of this classification, new processes can be developed which have not been used by now. Comparison on the basis of some common parameter is suggested for determining the efficiency E: $E = G/\Pi \cdot (dN/d\tau)$. G is the quantity of the main component; Π is the parameter chosen; $dN/d\tau$ is the variation of the second component with time. There are 4 figures and 14 references: 7 Soviet, 3 US, 1 British, 2 German, and 1 Swiss.

ASSOCIATION: Moskovskiy institut tsvetnykh metallov i zolota im. M. I. Kalinina
(Moscow Institute of Nonferrous Metals and Gold imeni M. I. Kalinin)

SUBMITTED: September 15, 1958

Card 3/3

NISEL'SON, L.A.; IVANOV-EMIN, B.N.; LARIONOVA, L.Ye.

Crystals-liquid phase equilibria in binary systems formed by $ZrCl_4$, $HfCl_4$, $SnCl_2$, and $BiCl_3$. Zhur. neorg. khim. 6 no.1:186-191 '61.
(MIRA 14:2)
(Zirconium chloride) (Hafnium chloride)
(Phase rule and equilibrium)

S/078/61/006/003/019/022
B121/B208

AUTHORS: Nisel'son, L. A., Petrusevich, I. V.

TITLE: Phase equilibria in the systems $SiCl_4$ - BCl_3 and $SiBr_4$ - BBr_3

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 3, 1961, 748-749

TEXT: The phase equilibria in the systems $SiCl_4$ - BCl_3 and $SiBr_4$ - BBr_3 were studied. The starting materials were purified by continuous boiling with copper filings and subsequent rectification. The systems were thermally analyzed by the heating curves recorded by Kurnakov's pyrometer. The melting-point diagrams of the systems studied are of the eutectic type. The heat of solution of $SiCl_4$ in BCl_3 was found to be 2.0 kcal/mole; the heat of solution of $SiBr_4$ in BBr_3 was 2.9 kcal/mole. A chemical reaction between the components in the systems $SiCl_4$ - BCl_3 and $SiBr_4$ - BBr_3 was not observed. The vapor pressure of the saturated BBr_3 vapors may be expressed by the equation

Card 1/2

S/078/61/006/003/022/022
B121/B208

AUTHORS: Vaks, S. A., Seryakov, G. V., Nisel'son, L. A., Sidorina, L. S.

TITLE: Liquid-vapor equilibrium in systems formed from the tetrachlorides of titanium, silicon, and carbon

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 3, 1961, 756-759

TEXT: The equilibrium between liquid and vapor (at 760 mm Hg) in the systems $TiCl_4$ - $SiCl_4$, $TiCl_4$ - CCl_4, and CCl_4 - $SiCl_4$ was studied refractometrically at 20°C. The tetrachlorides had been purified by distillation, and the titanium and silicon chlorides also chemically. Data on the liquid-vapor equilibrium in the systems $TiCl_4$ - $SiCl_4$, $TiCl_4$ - CCl_4, and CCl_4 - $SiCl_4$ at 760 mm Hg are summarized in a table. The refractive index in the systems $TiCl_4$ - CCl_4 and $TiCl_4$ - $SiCl_4$ was found to be a linear function of the composition. In the system

Card 1/3

Liquid-vapor equilibrium...

S/078/61/006/003/022/022
B121/B208

$TiCl_4$ - $SiCl_4$, a negative deviation from Raoult's law was found on the side of the lower-boiling component. The system $TiCl_4$ - CCl_4 is nearly ideal, while the system CCl_4 - $SiCl_4$ distinctly differs from the ideal state with respect to the course of the interface between liquid and vapor. There are 4 figures, 1 table, and 3 references: 1 Soviet-bloc and 2 non-Soviet-bloc.

✓

SUBMITTED: August 2, 1960

Card 2/3

Liquid-vapor equilibrium...
Card 3/3

S/078/61/006/005/022/022
B121/B206

① Система $TiCl_4 - SiCl_4$				① Система $TiCl_4 - CCl_4$				① Система $CCl_4 - SiCl_4$			
t, °C	② Содержание $SiCl_4$, мол. %		③ относительная летучесть (α)	t°, C	② Содержание CCl_4, мол. %		③ относительная летучесть (α)	t°, C	② Содержание $SiCl_4$, мол. %		③ относительная летучесть (α)
	ⓐ в жидкой фаз. x	ⓑ в паровой фаз. y			ⓐ в жидкой фаз. x	ⓑ в паровой фаз. y			ⓐ в жидкой фаз. x	ⓑ в паровой фаз. y	
57,2	100	100	—	76,5	100	100	—	57,2	100	100	—
57,9	97,66	99,65	6,78	77,0	97,97	99,615	5,4	58,1	92,5	95,8	1,64
59,7	94,18	99,22	7,87	78,5	88,9	97,80	5,2	60,0	78,3	85,3	1,61
60,9	87,84	98,09	7,15	83,6	77,7	95,03	5,5	61,6	67,0	78,0	1,60
61,9	85,0	98,0	8,7	86,4	68,5	92,0	5,3	63,1	60,6	72,1	1,68
63,8	80,2	97,16	8,5	93,7	52,4	85,2	5,2	64,2	54,0	66,5	1,70
66,1	73,15	96,18	9,3	102,4	37,0	74,5	5,0	67,2	36,7	50,5	1,75
69,1	66,4	94,78	9,25	112,0	23,0	59,5	4,9	68,7	27,6	41,0	1,82
78,0	49,5	91,8	10,6	125,2	10,1	38,2	5,1	71,2	19,3	30,0	1,79
88,9	30,4	83,2	11,4	131,8	3,10	12,8	4,6	72,8	12,2	20,2	1,82
105,2	17,0	66,5	9,7	136,5	0	0	—	74,4	6,6	11,5	1,83
116,5	8,7	46,4	9,1					76,5	0	0	—
123,4	5,5	33,2	8,6								
129,0	2,50	18,5	8,8								
132,5	0,81	8,0	9,4								
134,4	0,37	3,6	8,9								
135,6	0,19	1,58	9,3								
136,4	0	0	—								

Legend to the Table:
1) system;
2) content, mole%;
a) in liquid phase;
b) in vapor phase;
3) relative fugacity.

IVANOV-EMIN, B.N.; NISEL'SON, L.A.; RABOVIK, Ya. I.; LARIONOVA, L.Ye.

Complex compounds of gallium halides with o-phenanthroline. Zhur. neorg.khim. 6 no.5:1142-1146 My '61. (MIRA 14:4)

(Gallium compounds) (Phenanthroline)

NISEL'SON, L.A.

Density of $ZrCl_4$ and $HfCl_4$ in the vapor and liquid state. Zhur. neorg.khim. 6 no.5:1242-1244 My '61. (MIRA 14:4)

(Zirconium chloride) (Hafnium chloride)

IVANOV-EMIYE, B.N.; NISEL'SON, L.A.; IVOLGINA, A.T.

Solubility of yttrium hydroxide in sodium hydroxide solutions.
Zhur.neorg.khim. 6 no.6:1483-1484 Je '61. (MIRA 14:11)
(Yttrium oxide) (Sodium hydroxide)

NISEL'SON, L.A.; SOKOLOVA, T.D.

Liquid-vapor phase eqiulibrium in systems formed by $TiCl_4$, $VOCl_3$, and $POCl_3$. Zhur. neorg. khim. 6 no.7:1645-1651 Jl '61. (MIRA 14:7)

(Systems (Chemistry))

S/080/61/034/011/001/020
D201/D301

AUTHORS: Ivanov-Emin, B.N., Nisel'son, L.A., and Petrusevich, L.V.

TITLE: The synthesis and purification of boron bromide and iodide

PERIODICAL: Zhurnal prikladnoy khimii, v. 34, no. 11, 1961, 2378 - 2384

TEXT: The authors carried out experiments for preparing boron bromide and iodide directly from the elements. As starting materials pure bromine and iodine and samples of amorphous boron containing 87 - 99.5 % B were used. The halogenations were performed in vertical quartz reactors, 3 - 5 cm in diameter. Boron was bricketed with a sugar solution in methanol and the hologenation process was carried out in a stream of argon at 640 - 1050°C for 3 - 6 hours. During halogenation fractions of the halodes were analyzed for free Br_2 and I_2 contents. For comparison purposes, one bromation reaction was performed in the reactor lying almost horizontally. All ex-

Card 1/3

S/080/61/034/011/001/020
D201/D301

The synthesis and purification ...

perimental details are given in full. The yields were markedly higher in vertical reactors than in the horizontal ones. the optimum temperature being 850 - 900°C for both halogenation reactions; the bromination yield was 94.5 - 99.5 % B Br_3. The iodination process was quite similar to that of bromination, but with lower yields (63.5 - 50 %). Purification of the crude halides, as well as of technical B Cl_3, was carried out by distillation in a rectifying column of a plate-sieve type, with 25 real plates. The rectification of technical BCl_3 and that of the crude BBr_3 was easily carried out: after the first distillation BCl_3 was practically free from $SiCl_4$ and $COCl_2$, present in the initial product, and BBr_3 was practically free from $SiBr_4$ and other volatile components; a pure colorless product was obtained by a second distillation in presence of copper filings. Purification of the crude iodide was not so easy owing to the high iodide content in the product. This was overcome by converting the free I_2 to SnI_4, with metallic tin. The authors were able, by this method, to obtain from 3.2 kg of the iodination product, containing about 25 % of SnI_4, 0.4 % SiI_4 and some other impurities, 2.05 kg of practically pure BI_3, after one fractional

Card 2/3

The synthesis and purification ... S/080/61/034/011/C01/020
D201/D301

distillation. There are 3 figures and 4 tables and 11 references: 6 Soviet-bloc and 5 non-Soviet-bloc. The references to the English-language publications read as follows: E. Gamble, P. Gilmont, J. Stoff, J.Am. Chem. Soc., 62, 1257, 1940; W. Schumb, E. Gamble, M. Banus, J. Am. Chem.Soc., 71, 3225, 1949.

SUBMITTED: December 12, 1960

Card 3/3

S/828/62/000/000/015/017
E071/E135

AUTHOR: Nisel'son, L.A.

TITLE: Separation and purification of halogenides of zirconium and hafnium, niobium and tantalum by methods based on differences in the volatility

SOURCE: Razdeleniye blizkikh po svoystvam redkikh metallov. Mezhvuz. konfer. po metodam razdel. blizkikh po svoyst. red. metallov. Moscow, Metallurgizdat, 1962, 168-185.

TEXT: The possibilities of separation of the above elements by rectification are discussed and supported by experimental data obtained on a laboratory apparatus. The following processes were examined: separation and purification of tantalum and niobium by rectification of products of interaction of their pentachlorides with phosphorus oxychloride; rectification of pentachlorides of tantalum and niobium; separation of zirconium and hafnium by rectification of products of interaction of their tetrachlorides with phosphorus oxychloride; separation of zirconium and hafnium by extractive rectification of their tetrachlorides [Abstractor's note: this process is discussed but no experimental work is

Card 1/2

Separation and purification of ... S/828/62/000/000/015/017
E071/E133

reported ; separation of zirconium and hafnium by rectification of their tetrachlorides under pressure. The latter process is of particular interest for industrial application but it presents difficult problems. These could be solved by designing special apparatus applying reliable temperature monitoring, salts as heat carriers, voltage stabilization and automation of the process with a view to continuous operation.

There are 3 figures and 4 tables.

Card 2/2

S/828/62/000/000/016/017
E071/E135

AUTHORS: Zelikman, A.N., Kreyn, O.Ye., Nisel'son, L.A., Gorovits, N.N., and Ivanova, Z.I.

TITLE: Separation of tungsten and molybdenum by utilising the difference in volatility of their chlorides and oxychlorides

SOURCE: Razdeleniye blizkikh po svoystvan redkikh metallov. Mezhvuz. konfer. po metodam razdel. blizkikh po svoyst. red. metallov. Moscow, Metallurgizdat, 1962, 186-197.

TEXT: A method of separating tungsten from molybdenum, based on evaporation of MoO_2Cl_2 on heating of molybdenum trichloride with sodium chloride to a temperature of 600-700 °C, was studied. With contents of 0.01 to 0.16 and 1.035% W in the starting molybdenum trioxide the purified product contained less than (6 to 9) x 10^{-4} and 1.5 x 10^{-3}% W respectively. It was established that it is possible to separate tungsten and molybdenum by rectification of their higher chlorides, WCl_6 and $MoCl_5$ (rectification column data: diameter 30 mm, height 600 mm, 15 sieve plates, with 45 holes of 1 mm diameter).

Card 1/2

Separation of tungsten and molybdenum... S/828/62/000/000/016/017
E071/E135

From tungsten sexquichlorido containing about 5% $MoCl_5$, and from molybdenum pentachloride containing about 5% WCl_6, purified chlorides containing below 0.01% of admixture of molybdenum or tungsten respectively with yields of the main fractions of 70-80% were obtained.
There are 6 figures and 7 tables.

Card 2/2

33279
S/078/62/007/002/006/019
B119/B110

5.4210 1087

AUTHORS: Nisel'son, L. A., Voytovich, B. A.

TITLE: The $SiCl_4$ - $POCl_3$ - BCl_3 system

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 2, 1962, 360 - 363

TEXT: The equilibria between crystalline and liquid phases and between liquid and vapor phases of the systems $POCl_3$ - BCl_3 and $SiCl_4$ - $POCl_3$ - BCl_3 were studied. The methods are described by the first author in Zh. neorg. khimii, 5, 1139 (1960); 3, 2150 (1958); and I. A. Shcheka et al., 1, 964 (1956). This study is of interest for obtaining purest Si. Results: BCl_3 and $POCl_3$ form in solid state the compound $BCl_3 \cdot POCl_3$ which dissociates almost completely on melting (melting point 83.8°C). (The equation of A. B. Mlodzeyevskiy and O. A. Yesin can be used for calculating the dissociation constant immediately above the melting point.) The heat of solution of $BCl_3 \cdot POCl_3$ in $SiCl_4$ is 4.6 kcal/mole. When dissolved in $SiCl_4$, the compound is totally dissociated (in BCl_3 and $POCl_3$). The

Card 1/2

33279

The $SiCl_4$ - $POCl_3$ - BCl_3 system S/078/62/007/002/006/019
B119/B110

simultaneous presence of small BCl_3 and $POCl_3$ quantities in $SiCl_4$ has no influence on their relative volatility as to $SiCl_4$. There are 4 figures, 2 tables, and 9 references: 7 Soviet and 2 non-Soviet. The reference to the English-language publication reads as follows: A. B. Burg, M. R. Poss. J. Amer. Chem. Soc., 65, 1637 (1943).

X

ASSOCIATION: Gosudarstvennyy institut redkikh metallov (State Institute of Rare Metals)

SUBMITTED: December 24, 1960

Card 2/2

IVANOV-EMIN, B.N.; NISEL'SON, L.A.; LARIONOVA, L.Ye.

Properties of solutions of alkali metal gallates. Zhur.neorg.khim.
7 no.3:522-526 Mr '62. (MIRA 15:3)
(Gallic hydroxide)

34868
S/078/62/007/005/015/019
B110/B158

21.2500

AUTHOR: Nisel'son, L. A.

TITLE: Constitution diagrams of binary systems formed by zirconium and hafnium halides

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 5, 1962, 693 - 694

TEXT: The crystal - liquid phase equilibrium was investigated in binary systems of zirconium and hafnium tetrachlorides, tetrabromides, and tetraiodides. The halides were produced from Zr (0.05% Hf), Hf (0.5% Zr), Cl, Br, and I. The binary systems $ZrCl_4$-$HfCl_4$, $ZrBr_4$-$HfBr_4$, ZrI_4-HfI_4 exhibit unlimited solubility in the liquid and solid states. Their constitution diagrams show an almost straight-line course for the liquidus curve with the solidus almost beside it. This is because the Zr and Hf atomic radii are almost equal, the tetrahalide crystal lattices are identical, and their melting points are very close. The systems ZrI_4-$ZrCl_4$, and $ZrBr_4$-$ZrCl_4$ constitute a continuous series of solid solutions with a minimum. ZrI_4-$ZrCl_4$ has a lower minimum (~58 mole% of $ZrCl_4$,

Card 1/2

Constitution diagrams of binary... S/078/62/007/003/015/019
B110/B138

~368°C) due to the greater difference between the atomic radii of I and Cl than between Br and Cl. There are 2 figures, 1 table, and 3 references: 2 Soviet and 1 non-Soviet.

SUBMITTED: October 4, 1960

Card 2/2

S/078/62/007/005/004/014
B101/B110

AUTHORS: Nisel'son, L. A., Teslitskaya, M. V., Shvedova, T. A.

TITLE: Synthesis of zirconium(IV) iodide and hafnium(IV) iodide by halogen exchange

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 5, 1962, 971 - 974

TEXT: The following reactions are discussed for preparing pure $Zr(Hf)I_4$: (A) $ZrCl_4 + 4NaI \rightleftharpoons ZrI_4 + 4NaCl$. The initial mixture was molten in an evacuated ampoule (650-700°C), and the ampoule heated on one side (initially 400°C, finally 650-700°C) to effect sublimation of the substance into the colder part. The sublimate contained 85.5% by weight of ZrI_4 and 14.5% by weight of $ZrCl_4$. Complete separation of the chloride from the iodide was not attained. (B) $ZrCl_4 + SiI_4 \rightleftharpoons ZrI_4 + SiCl_4$ (at 250-320°C) also yielded only 78% substitution of chlorine by iodine. (C) $3Zr(Hf)Cl_4$

Card 1/3

S/078/62/007/005/004/014
B101/B110

Synthesis of zirconium(IV) iodide ...

+ $2Al_2I_6 \rightleftharpoons 3Zr(Hf)I_4 + 2Al_2Cl_6$ (at 300-365°C) produced a 100% yield of ZrI_4 or HfI_4, respectively, containing 0.1-0.05% Al. The reaction with Al_2Br_6 yielded only 80-85% substitution. (D) $ZrCl_4 + 4HI \rightleftharpoons ZrI_4 + 4HCl$. Because of the high vapor pressure of the resulting HCl, work was carried out at atmospheric pressure, and the HI in Ar as carrier gas was conducted over $ZrCl_4$ heated to 370°C. 81.5-82% substitution was attained. (E) Since ZrI_4 and $ZrCl_4$ form no stable compounds with each other and have different volatilities, their separation was attempted by distillation. A mixture of 29.4% by weight of $ZrCl_4$ and 70.6% by weight of ZrI_4 was heated to 400-420°C, finally to 500-520°C. The ampoule was cut into zones, and the condensates of the individual zones were analyzed. Fraction I consisted of $ZrCl_4$ with only 0.1% ZrI_4; fraction V consisted of 95% ZrI_4, and the distillation residue of 100% Al-free ZrI_4, while the initial mixture contained 0.1% Al. Besides this separation, the impurity was also removed.

Card 2/3

IVANOV-EMIN, B.N.; NISEL'SON, L.A.; GVOZDEVA, N.I.

Solubility of gallium hydroxide in sodium hydroxide and potassium hydroxide solutions at 25°C. Zhur.neorg.khim. 7 no.5:1150-1153 My '62. (MIRA 15:7)

(Gallium hydroxide) (Alkalies) (Solubility)

S/078/62/007/012/002/022
B144/B180

AUTHORS: Nisel'son, L. A., Sokolova, T. D.

TITLE: Orthobaric densities and critical parameters of zirconium (IV) and hafnium (IV) halides

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 12, 1962, 2653-2660

TEXT: From the orthobaric densities determined in high-purity Zr and Hf tetraiodides, tetrabromides and tetrachlorides, the critical values of these compounds were calculated. The vapor and liquid densities were determined in a range from about 360 to 690°C in a transparent oven containing a nitrite-nitrate bath for temperatures below 500°C or a nickel block for higher temperatures. The sample enclosed in a sealed ampoule or a pyonometer was placed in the bath or block. The values found for $ZrCl_4$ and $HfCl_4$ were somewhat higher and had a flatter maximum than those published earlier (Zh. neorgan. khimii, 6, 1242 (1961)). The critical temperature was derived from the maximum of the orthobaric density. The critical density was found according to the Cailletet-Mathias law; for

Card 1/2

37847

S/080/62/035/005/002/015
D204/D307

5.2410

AUTHORS: Nisel'son, L. A., Petrusevich, I. V., Shamray, F. I. and Fedorov, T. F.

TITLE: Preparation of elemental boron by reduction of its halides with hydrogen

PERIODICAL: Zhurnal prikladnoy khimii, v. 35, 1962, 984-989

TEXT: The present work was carried out to supplement existing data on the preparation of elemental B. Purified BCl_3, BBr_3, BI_3 and H_2 were used under anhydrous conditions. The reactor consisted of a quartz tube enclosing a pair of Mo electrodes connected by a Ta wire 100 x 8 x 0.10 mm, on which the B was deposited. Temperatures were varied from 800 to 1400°C and the molar $(BX_3):(H_2)$ ratios, (n), were made 1:3-25. The interactions took place over 1.7 - 8 hours. The rate of B deposition increased rapidly with temperature and tended to be higher for lower n. For BBr_3/H_2 mixtures the

Card 1/2

Preparation of elemental ... S/080/62/035/005/002/015
D204/D307

yields of B increased linearly from ~3% at 800°C to ~50% at 1300°C, almost independently of n. For a given temperature the rate of B deposition increased in the order $BCl_3 < BBr_3 < BI_3$. Between 800 and 900°C brown, friable deposits of amorphous B were obtained for all n studied, from BBr_3/H_2 mixtures. At higher temperatures and n, black, "graphite" B was produced, and "metallic" crystalline boron formed at and above 1200°C with 3 or less moles H_2/mole BBr_3. Similar regions of formation of each form of B are believed to exist for BCl_3-H_2 and BI_3-H_2 systems. There are 6 figures and 1 table.

SUBMITTED: January 25, 1961

Card 2/2

S/080/62/035/003/002/024
D258/D302

AUTHORS: Seryakov, G. V. and Nisel'son, L. A.

TITLE: The relationship between relative volatility and mutual solubility

PERIODICAL: Zhurnal prikladnoy khimii, v. 35, no. 3, 1962, 482-486

TEXT: In continuation of earlier work the authors studied the influence of limited mutual solubility on the relative volatility of components in binary systems. It was assumed in the case of a binary system of limited solubility that the vapor pressures of the solvent and solute in each region obeyed Raoult's and Henry's laws respectively and the relationship between the mole fractions, y and x, of component A in the gaseous and liquid phases respectively, was thus given for the A-rich region by

$$y = \frac{P_A \cdot x}{P_A \cdot x + K_B(1 - x)} \qquad (2)$$

Card 1/3

where P_A was the vapor pressure of pure liquid A and K_B Henry's constant for B. K_B was expressed as $P_B = (1 - X_2)/(1 - X_1)$, where X_1 and X_2 were the mole-fractions of A in liquid phases rich in either A or B respectively. The relative volatility for the A-rich region was

$$\alpha_{A/B} = \frac{y(1 - x)}{x(1 - y)} = \frac{P_A}{P_B} \cdot \frac{x_1}{x_2} \qquad (5)$$

The limiting value of (5), as $X_2 \to 0$, was:

$$\alpha_{A/B} = \alpha_{A/B\ \mathrm{ideal}} \cdot X_1 \; [B]$$

where $X_1[B]$ was the mole fraction of B in a saturated solution, rich in A. This correction to Raoult's law was checked experimentally with solutions of Fe_2Cl_6 in $TiCl_4$ and $SiCl_4$; Al_2Cl_6 in $SiCl_4$; $SbCl_3$ in $SiCl_4$; and Mg in Na. The experimental data were in agreement with the calculated values. There are 1 table and 4 Soviet-bloc references.

SUBMITTED: June 26, 1960

NISEL'SON, L.A.; PETRUSEVICH, I.V.; SHAMRAY, F.I.; FEDOROV, T.F.

Preparation of elemental boron by hydrogen reduction of its halide. Zhur.prikl.khim. 35 no.5:984-989 My '62. (MIRA 15:5)
(Boron) (Boron halides) (Hydrogen)

S/080/62/035/007/004/013
D267/D307

AUTHORS: Zelikman, A.N., Kreyn. O.Ye., Nisel'son, L.A. and Ivanova, Z.I.

TITLE: Separation of tungsten from molybdenum by the rectification of their chlorides

PERIODICAL: Zhurnal prikladnoy khimii, v. 35, no. 7, 1962, 1467-1472

TEXT: WCl_6 and $MoCl_5$ were obtained from pure metals by chlorination at [illegible]-750°C, distilled in an argon atmosphere to separate the oxychlorides, after which WCl_6 with about 5% $MoCl_5$ or vice versa were rectified on a plate column. It was found that the impurity content of the purified chloride is less than 0.015%, and that the yield of the rectified chloride is 70-80% of theoretical. There are 5 figures and 3 tables.

SUBMITTED: June 2[illegible], 1961

Card 1/1

NISEL'SON, L.A.; VIGDOROVICH, V.N.; SERYAKOV, . .V.

Interphase distribution of components in the low concentration region. Zhur. fiz. khim. 36 no.4:697-702 Ap '62. (MIRA 15:6)

1. Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut redkometallicheskoy promyshlennosti i Institut tsvetnykh metallov imeni M.I.Kalinina.
(Systems (Chemistry)) (Phase rule and equilibrium)

L 17126-63 EWP(q)/EWT(m)/BDS AFFTC RDW/JD/AH

ACCESSION NR: AP3000905 S/0279/63/000/002/0079/0085

AUTHORS: Nisel'son, L. A.; Pustil'nik, A. I.; Soshnikova, L. A. (Moscow) 61

59

TITLE: Purifying selenium from tellurium by rectification

SOURCE: AN SSSR. Izv. otd. tekh. nauk. Metallurgiya i gornoye delo, no. 2, 1963, 79-85

TOPIC TAGS: rectification, purification, Se, Te, density, viscosity, surface tension

ABSTRACT: The authors made their experiment because the common technique of obtaining Se (by distillation) is ineffective in eliminating certain elements that have comparable volatility (especially Te, Sb, and S). Because of complications in construction if rectification were carried on in a vacuum and because such properties as viscosity and surface tension are thus altered deleteriously, it appeared best to rectify Se at ordinary atmospheric pressure. The setup is illustrated in Fig. 1 (see Enclosure 1). The internal diameter of the column is 30-32 mm. The sieve plate has 40 openings 0.8 mm in diameter, formed ultrasonically. The distance between plates is 30-32 mm, and 10 plates are used in the column. To prevent congelation of the Se, the head of the apparatus is equipped with an electrical

Card 1/4

L 17126-63

ACCESSION NR: AP3000905

2

heating element. The thermally insulated jacket of the column, with its electrical heater, is made of glass tubing with asbestos insulation, and the jacket has a transparent window for observation. The temperature was measured in tests with an accuracy of 0.5C by a Chromel-Alumel thermocouple and a semiautomatic R2/1 potentiometer. In testing the equipment, rectification of Se suffered from the difficulty of maintaining normal conditions, resulting from unequal (impulsive) boiling of Se and from the very narrow range of operating flow rates into the column. The degree of purification obtained in the experiments proved to be substantially less than computed values indicated they should be. The authors conclude that this is due partly to the problem of maintaining steady conditions and partly to imperfections in the design of the column head. They are convinced the recification method has great promise for Se. Orig. art. has: 4 figures and 6 tables.

ASSOCIATION: none

SUBMITTED: 06Aug62 DATE ACQ: 12Jun63 ENCL: 01

SUB CODE: ML NO REF SOV: 014 OTHER: 008

Card 2/2

L 18524-63 EPF(n)-2/EWP(q)/EWT(m)/BDS/ES(s)-2 AFFTC/ASD/SSD Pt-4/Pu-4

ACCESSION NR: AP3002389 WW/JD/JG S/0279/63/000/003/0110/0110

AUTHORS: Nisel'son, L. A.; Pustil'nik, A. I. (Moscow)

72

TITLE: Density and viscosity of liquid niobium and tantalum pentachlorides

27

SOURCE: AN SSSR. Izv. Otd. tekhnicheskikh nauk. Metallurgiya i gornoye delo, no. 3, 1963, 110

TOPIC TAGS: niobium pentachloride, tantalum pentachloride

A

ABSTRACT: Density (ρ) and viscosity (η) of liquid $NbCl_5$ and $TaCl_5$ have been determined at the temperature interval of 300-320C. Each substance contained no more than 0.02% of impurities. Densities were determined in sealed quartz picnometers, and temperatures were measured with both standard thermometers and thermocouples (temperature accuracy was ± 0.1C). The results were corrected for the thermal expansion of quartz and for the weights of vapors. Relative error in density was 5×10^{-2}%, in viscosity it was 0.2%. Viscosities were determined in a modified Martin viscosimeter. Data were processed by the method of least squares. It was established that:

$$\rho_{NbCl_5} = 2.0737 - 3.115 \cdot 10^{-3} \cdot \Delta t + 3.58 \cdot 10^{-6} \cdot \Delta t^2$$

$$\rho_{TaCl_5} = 2.6840 - 4.100 \cdot 10^{-3} \cdot \Delta t$$

Card 1/2

L 18524-63

ACCESSION NR: AP3002389

$$\eta_{NbCl_5} = 0.921 - 1.325\cdot10^{-3}\cdot\Delta t + 1.120\cdot10^{-4}\cdot\Delta t^2 - 4.30\cdot10^{-7}\cdot\Delta t^3$$

$$\eta_{TaCl_5} = 1.003 - 1.667\cdot10^{-3}\cdot\Delta t + 1.8\cdot10^{-4}\cdot\Delta t^2 - 8.455\cdot10^{-7}\cdot\Delta t^3$$

Orig. art. has: 4 formulas.

ASSOCIATION: none

SUBMITTED: 31Jan63	DATE ACQ: 12Jul63	ENCL: 00
SUB CODE: CH	NO REF SOV: 004	OTHER: 000

Card 2/2

S/078/63/008/004/003/013
A059/A126

AUTHORS: Pugachevich, P.P., Nisel'son, L.A., Sokolova, T.D., Anurov, N.S.

TITLE: Density, viscosity, and surface tension of carbon tetrachloride and tin tetrachloride

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 8, no. 4, 1963, 791 - 796

TEXT: The density of CCl_4 and $SnCl_4$ was measured in a sealed quartz pycnometer (Fig. 1) with a volume of about 20 cm^3 and a capillary diameter of about 2 mm. The volume expansion of quartz was taken as $1.5 \cdot 10^{-6}$ in the calculations. The correction for the vapors in the free volume of the capillary was calculated from the ideal-gas equation where the saturated-vapor pressure was determined from the equations:

$$CCl_4 \ldots \log p = \frac{-2400}{T} - 5.3 \log T + 23.6 , \quad (1)$$

and

$$SnCl_4 \ldots \log p = \frac{-1922}{T} + 7.865 . \quad (2)$$

Card 1/5

The relative error can be about $5 \cdot 10^{-2}\%$. The viscosity was measured with the somewhat modified Martin viscometer made of molybdenum glass. The capillary diameter was selected between 0.3 and 0.5 mm, and the length of tube 4 was 180 mm. The viscosity was calculated from the equation:

$$\eta = c\,(\rho_1 - \rho_v)\tau\ , \qquad (3)$$

where c is the constant of the apparatus, ρ_1 and ρ_v is the density of the liquid and the vapor, respectively, at a given temperature, and τ is the time of flow. The relative error of the viscosity determination is not in excess of 0.2%. The surface tension was measured with the setup shown in Figure 3, and calculated from the equation:

$$\sigma = \frac{1}{2}\,g\,(\rho_1 - \rho_v)\,r\,h_1\left[1 - \frac{2}{3}\frac{r}{h_1} - \frac{1}{3}\frac{r^2}{h_1^2}\right], \qquad (4)$$

where g is acceleration due to gravity, r the inner radius of tube 6 at the top (in this case, r = 0.010 cm). The relative error in no case exceeded 0.2%. Equations relating density, viscosity, and surface tension of CCl_4 and $SnCl_4$ to temperature found by the least-square methods were: $\rho = 1.6287 - 0.001763\ t$ -

S/078/63/008/004/003/013
A059/A126

Density, viscosity, and surface tension of ....

$- 0.00000209\ t^2$ (for CCl_4) and $\rho = 2.2789 - 0.0025437\ t - 0.00000081\ t^2$ (for $SnCl_4$)); $\eta = 1.3408 - 0.022493\ t + 0.0002222\ t^2 - 0.000000946\ t^3$ (for CCl_4) and $\eta = 1.0917 - 0.01241\ t + 0.00007712\ t^2 - 0.000000193\ t^3$ (for $SnCl_4$); and $\sigma = 29.21 - 0.1259\ t$ (for CCl_4) and $\sigma = 29.92 - 0.1134\ t$ (for $SnCl_4$). There are 5 figures and 6 tables.

ASSOCIATION: Institut obshchey i neorganicheskoy khimii Akademii nauk SSSR (Institute of General and Inorganic Chemistry of the Academy of Sciences, USSR), Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut redkometallicheskoy promyshlennosti (State Design and Planning Scientific Research Institute of the Rare Metal Industry)

SUBMITTED: August 24, 1962

Card 3/5

S/078/63/008/004/003/013
A059/A126

Density, viscosity, and surface tension of ....

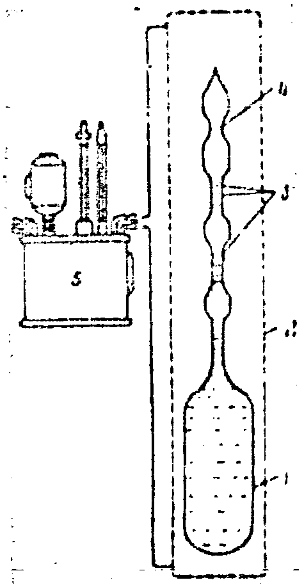


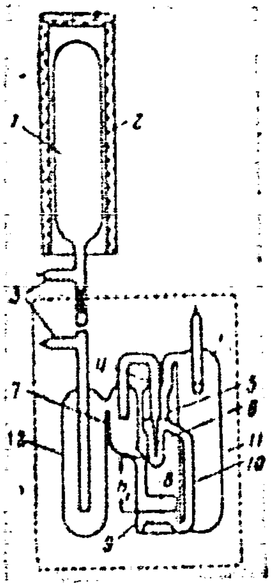
Figure 1: Pycnometer for the determination of the density of chlorides: 1 - pycnometer; 2 - constant temperature jacket; 3 - marks; 4 - place of opening of the pycnometer; 5 - Hoeppler thermostat.

Card 4/9

S/073/63/008/004/003/013
A059/A126

Density, viscosity, and surface tension of ....

Figure 3: Improved gas setup for the determination of the surface tension: 1 - gas cylinder; 2 - electric furnace; 3 - tube of the apparatus for liquid and gas filling; 4, 8, 10 - connecting pipe; 5 - container for tube calibration; 6 - calibrated tube; 7 - intermediate cylinder; 9 - pressure-gauge cylinder; 11 - cushioning cylinder; 12 - trap.



Card 5/5

IVANOV-EMIN, B.N.; NISEL'SON, L.A.; SOKOLOVA, T.D.

Reactions of scandium chloride with ethylenediamine. Zhur. neorg. khim. 8 no.6:1381-1383 Je '63. (MIRA 16:6)

(Scandium chloride)
(Ethylenediamine)

NISEL'SON, L. A.
TITLE: Seminar on refractory metals, compounds, and alloys (Kiev, April 1963).
SOURCE: Atomnaya energiya, v. 15, no. 3, 1963, 266-267.

ACCESSION NR: AP3008085

Ye. I. Yelagina, M. Kh. Abrikosov. Synthesis and investigation of rhenium silicide.

G. P. Shveykin and others. Kinetics of niobium oxicarbide decomposition in vacuum, interaction of niobium and carbon monoxide, etc., in connection with the development of the carbothermal method of extraction of niobium from its oxides.

L. A. Nisel'son and others. Obtaining niobium, tantalum, and their alloys by reduction of gaseous chlorides with hydrogen on a heated surface.

G. V. Samsonov, S. N. L'vov, V. N. Paderno. Obtaining ZrC, HfC, NbC, and TaC solid solutions by hot compacting of mixtures of oxides with carbon.

V. F. Funke, V. I. Pshenichny*y. Study of conditions of obtaining TiC, ZrC, and VC from oxides.

V. N. Bondarev. Investigation of synthesis of transition-metal

Card 4/11

POLYAKOV, Ya.M.; NISEL'SON, L.A.; KRESTOVNIKOV, A.N.

Process for producing tantalum and niobium by the reduction of their pentachlorides with hydrogen (reduction of $TaCl_5$). Zhur.prikl.khim. 36 no.1:25-33 Ja '63. (MIRA 16:5)

(Tantalum) (Niobium)

ACCESSION NR: AP4019808 S/0279/64/000/001/0067/0077

AUTHOR: Meyerson, G. A. (Moscow); Kisel'son, L. A. (Moscow); Chou, Ch'u-Ming (Moscow)

TITLE: Production of silicon carbide and its alloys with boron by reduction from the vapor phase over a heated surface

SOURCE: AN SSSR. Izv. Metallurgiya i gornoye delo, no. 1, 1964, 67-77

TOPIC TAGS: silicon carbide, silicon carbide production, silicon carbide alloy, boron containing alloy, boron containing silicon carbide alloy, vapor phase reduction, silicon tetrachloride reduction, silicon carbide crystallization

ABSTRACT: The authors discuss the existing literature on silicon carbide production, the growth of large, single, high-purity crystals, the α and β phases, the production of SiC from a vapor-gas mixture of $SiCl_4$, toluene and hydrogen, etc. On calculating the changes in free energy for the formation of SiC from a mixture of $SiCl_4$ with some carbon-containing products in the presence and absence of hydrogen, they found that a substantial reduction of the isobaric potential accompanies the process when hydrogen is present; they conclude from their thermodynamic analysis that the initial materials must be carefully purified when high purity SiC is produced by deposition from a vapor-gas mixture over a heated surface. Their

Card 1/3

ACCESSION NR: AP4019808

experiments, carried out to study the physical and chemical conditions of deposition, employed a core of preliminarily carbidized tantalum wire on which pure $SiCl_4$ was deposited in a reactor (illustrated) from carefully purified $SiCl_4$, in the presence of electrolytically purified H_2 and toluene. Core temperature varied from 1400 to 2000C, the Si:C ratio in the initial vapor-gas mixture from 1 to 6, the rate of vapor-gas flow (normal atmospheric pressure, 25C) from 0.5 to 1.9 liters/min, and the amount of H_2 from 7 to 11 times the stoichiometric proportion. Pure SiC depositing at 1600-1800C represented the β phase; the optimal Si:C ratio was found to be 3:1, the excess Si being required to prevent deposition of free graphite. Other experiments concerned alloying SiC with B (1600-1650C, vapor-gas flow about 1.0 liter/min at 25C, hydrogen excess 11 times the stoichiometric proportion) by combined deposition from $SiCl_4$, C_7H_8 and BBr_3. The Si:C ratio in the initial mixture was 3:1 and constant, the amount of B varied up to 9% in relation to SiC. The B content in the deposit corresponded to the B:C ratio in the vapor-gas phase, and the microhardness of SiC was increased by addition of B. Various analyses of deposits with up to 8.5% B by weight indicated retention of a uniform solid-solution pattern of B substitution in the β-phase of SiC. An analysis of the kinetics of the SiC deposition process showed that the rate peaks at 1700-1800C, while its dependence on reagent concentration peaks around 2.5 g/liter (an 8-11 times excess of H_2 is optimal); the rate increases with rising velocity

Card 2/3

ACCESSION NR: AP4019608

of the vapor-gas flow and reaches about 0.4 g/cm^2·hr at 1600C, 1.8 liters/min (25C) for a tubular reactor with a diameter of 50 mm. The yield drops to 65% in relation to C. Introduction of B slows the rate of deposition to some extent. Orig. art. has: 2 tables, 7 graphs and 10 formulas.

ASSOCIATION: none

SUBMITTED: 06Aug63	DATE ACQ: 31Mar64,	ENCL: 00
SUB CODE: ML, CH	NO REF SOV: 010	OTHER: 018

Card 3/3

ACCESSION NR: AP4017567 S/0149/64/000/001/0131/0138

AUTHOR: Polyakov, Ya. M.; Nisel'son, L. A.; Krestovnikov, A. N.

TITLE: Preparation of niobium and tantalum from the vapor phase

SOURCE: IVUZ. Tsvetnaya metallurgiya, no. 1, 1964, 131-138

TOPIC TAGS: niobium, tantalum, niobium production, tantalum production, niobium coating, tantalum coating, vapor phase plating, niobium alloy, tantalum alloy

ABSTRACT: The following conclusions resulted from a review of Soviet and Western work on the preparation of niobium and tantalum from the vapor phase. The production of niobium and tantalum coatings, deposited from the vapor phase onto steel, iron, copper, nickel, molybdenum, tungsten, graphite, and quartz, is one of the most important uses of Nb and Ta. Thermal dissociation of $NbCl_5$, $NbBr_5$, NbI_5, $TaCl_5$, $TaBr_5$, and TaI_5 yields metals of highest purity. The reduction of niobium and tantalum pentachlorides by hydrogen is at present the most economical manufacturing technique. Reduction of niobium and tantalum halides, combined with those of alloying admixtures, may open the way to creation of Nb- and Ta based Ti, Zr, Al, W, Mo, and Sn alloys. Thermal curves for the deposition of Nb and Ta-pentahalides obtained by Rolsten (Trans.

Card 1/2

ACCESSION NR: AP4017667

Metallurgical Soc., AIME, 215, No. 3, 472, 1952 and J. Electrochem Sc-y, 106, No. 11, 975, 1959) and the work of Yemel'yanov. Yevstyukhin, and Leont'yev (Sb. Metallurgiya i metallovedeniye chisty*kh metallov, no. 2, 27, 1960 and no. 3, 127, 1961) on the kinetics of niobium iodide refining are discussed. The latter identify 2 types of temperature dependence for Nb-deposition — one monotonous at < 620 K and one with a maximum at > 620 K, which is believed to result from the existence of different Nb-iodides at 500-550 K (NbI_3) and 650 K (NbI_5). A maximum Nb-deposition rate of 30 g/hr was reached at 650 K in the reactor and 1135 K on the 1500 mm long thread. Orig. art. has: 5 graphs.

ASSOCIATION: Kafedra fiziko-khimicheskikh issledovaniy proizvodstva poluprovodnikovy*kh materialov i chisty*kh metallov, Moskovskiy institut stali i splavov (Department of Physicochemical Studies on the Production of Semiconductors and Pure Metals, Moscow Institute for Steel and Alloys)

SUBMITTED: 20May63	DATE ACQ: 23Mar64	ENCL: 00
SUB CODE: ML	NO REF SOV: 011	OTHER: 021

Card 2/2

ACCESSION NR: AP4036963 S/0078/64/009/005/1049/1052

AUTHOR: Nisel'son, L. A.; Pustil'nik, A. I.; Sokolova, T. D.

TITLE: Orthobaric density and critical parameters of niobium and tantalum pentachlorides.

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 5, 1964, 1049-1052

TOPIC TAGS: niobium pentachloride, tantalum pentachloride, orthobaric density, critical parameter, critical density, critical pressure, critical temperature, niobium tantalum analysis, density temperature relationship, Berthelot equation, liquid vapor phase equilibrium, crystal liquid phase equilibrium

ABSTRACT: The orthobaric density of $NbCl_5$ and $TaCl_5$ throughout the liquid state and in the vapor state, and their critical parameters were determined (fig. 1). The densities of the liquid $TaCl_5$ and $NbCl_5$ and of their mixtures were measured precisely from their melting temperatures (216.2 and 204.2 C, respectively) to 300-320 C. The critical parameters for $NbCl_5$ were: critical temperature 534 C, density $_{crit}$ 0.68 gm/cm^3, pressure P_{crit} 46 atmospheres; for $TaCl_5$ were: 494 C, 0.89 gm/cm^3 and 43 atmospheres. Since the liquid-vapor phase and the crystal-

Card 1/3

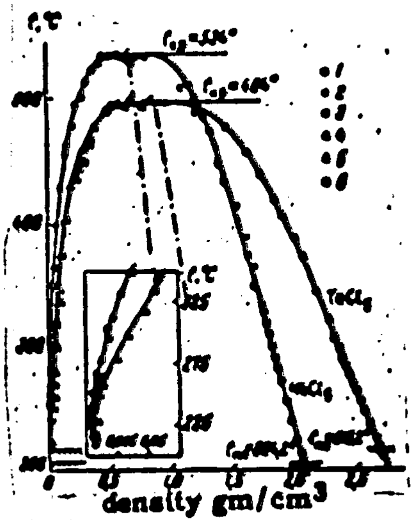
ACCESSION NR: AP4036963 ENCLOSURE: 01

Fig. 1. Data for orthobaric density of $NbCl_5$ and $TaCl_5$.

1.--$NbCl_5$ (vapor); 2--$NbCl_5$ (liquid), data obtained in a small picnometer; 3--$NbCl_5$ (liquid), data obtained in large picnometer; 4--$TaCl_5$ (vapor); 5--$TaCl_5$ (liquid), data obtained in small picnometer; 6--$TaCl_5$ (liquid), data obtained in large picnometer.

t_{kp} = critical temperature

t_{nn} = melting temperature



Card 3/3

NISEL'SON, L.A.; SOKOLOVA, T.D.

Orthobaric densities and the critical parameters of the niobium and tantalum pentabromides. Zhur. neorg. khim. 9 no.9:2066-2067 S '64. (MIRA 17:11)

1. Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut redkometallicheskoy promyshlennosti.

L 22695-65 EWT(m)/EPF(c)/EPF(n)-2/EWT(t)/EWP(b) Pr-4/Pu-4 IJP(c) JD/WW/JD
ACCESSION NR: AP5000500 S/0078/64/009/012/2779/2780

AUTHOR: Nisel'son, L. A.; Stolyarov, V. I.

TITLE: Relative volatility of zirconium tetrachloride and hafnium tetrachloride [illegible] their melting points

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 12, 1964, 2779-2780

TOPIC TAGS: zirconium hafnium relative volatility, Rayleigh equilibrium evaporation, zirconium tetrachloride, hafnium tetrachloride, rectification process

ABSTRACT: Determination of such volatility is important, since the rectification [illegible] starts at such temperatures. The authors undertook direct determination [illegible]ative volatility of a mixture of both tetrachlorides at about 450C, i.e. 15C [illegible] the melting point of $ZrCl_4$ by means of Rayleigh equilibrium evaporation [illegible] concentration in the liquid phase of 0 [illegible] mol %. The equipment [illegible] and the procedure described, results are tabulated. Hafnium determ- [illegible] was conducted by spectral analysis after the zirconium tetrachloride had

L 23495-65
ACCESSION NR: AP500050

C

[illegible] transformed into the dioxide. The mean value from 4 parallel tests gave [illegible]$_4$/HfCl$_4$ = 1.70 ± 0.01. Orig. art. has 1 table and 1 figure

ASSOCIATION: **None**

SUBMITTED: **05Aug63** ENCL: 00 SUB CODE: IC, OC

NO REF SOV: 004 OTHER: 002

Card 2/2

BR

ACCESSION NR: AP4024771 S/0080/64/037/003/0669/0672

AUTHOR: Nisel'son, L. A.; Polyakov, Ya. M.; Krestovnikov, A. N.

TITLE: Research on the process of niobium extraction by reduction of NbCl sub 5 by hydrogen. II Communication II

SOURCE: Zhurnal prikladnoy khimii, v. 37, no. 3, 1964, 669-672

TOPIC TAGS: niobium extraction, reduction, NbCl sub 5, TaCl sub 5, equilibrium constant, NbCl sub 5 reduction

ABSTRACT: From an earlier work (Ya. M. Polyakov, L. A. Nisel'son, A. N. Krestovnikov, ZhPKh, XXXVI, 1, 25 (1963)), it follows that the reduction of $NbCl_5$ with hydrogen occurs more easily and at lower temperatures than the reduction of $TaCl_5$. From the data of temperature dependence of the equilibrium constant (Kp) of the reaction equilibrium yields (Fig. 1) and degrees of conversion of

$$(NbCl_5) + 5/2(H_2) \rightleftarrows (Nb) + 5(HCl).$$

Card 1/3

ACCESSION NR: AP4024771

$NbCl_5$ into metal (Fig. 2) for various temperatures and $NbCl_5$ concentrations in the initial vapor-gaseous mixtures were computed. The data obtained makes it possible to estimate the temperature and concentration limits within which optimum operating conditions of the process can be created in industrial equipment, namely: 0.1-0.2 of niobium pentachloride mole in 1 mole of vapor-gaseous mixture and 1000-1300 C. In these conditions the rate of niobium precipitation was 0.7-1.5 g/cm^2. hr. with a yield of 1.5-3.2 g. of niobium in 1 mole of the mixture; degrees of conversion of niobium pentachloride into metal are 15-30% and specific consumption of electric power is 17-22 kw. hr. in one kg. of niobium (Fig. 3). It should be noted that the indexes mentioned above are not optimum and can be increased by taking into account the variation of the vapor-gaseous flow rate and apparatus design. "Graduate K. V. Tret'yakova took part in the experiment". Orig. art. has: 1 table, 5 figures.

ASSOCIATION: None

SUBMITTED: 28Dec62 DATE ACQ: 16Apr64 ENCL: 03

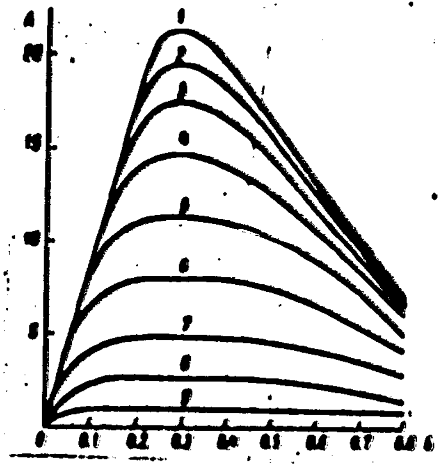
SUB CODE: OC NO REF SOV: 001 OTHER: 000

Card 2/5

ACCESSION NR: AP4024771

ENCLOSURE: 01

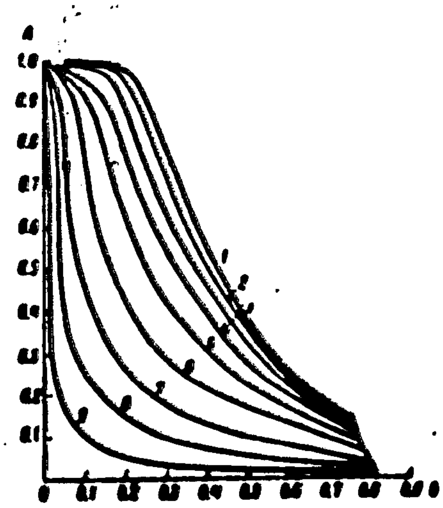
Fig. 1 - Dependence of equilibrium yield of niobium (A, g/mole of mixture) on initial concentration of niobium pentachloride (B, mole/mole of mixture) in vapor-gaseous mixture $NbCl_5 + H_2$ and on temperature. Temperature (°K): 1 - 1500, 2 - 1400, 3 - 1300, 4 - 1200, 5 - 1100, 6 - 1000, 7 - 900, 8 - 800, 9 - 700.



Card 3/5

ACCESSION NR: AP4024771 ENCLOSURE: 02

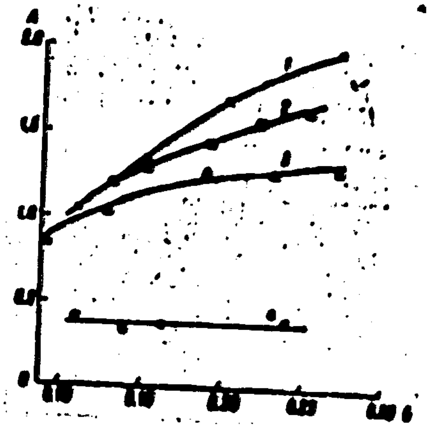
Fig. 2 - Dependence of equilibrium degree of conversion of niobium pentachloride into metal, on initial concentration of niobium pentachloride in vapor-gaseous mixture $NbCl_5 + H_2$ and on temperature. Symbols are the same as in Fig. 1



Card 4/5

ACCESSION NR: AP4024771 ENCLOSURE: 03

Fig. 3 - Dependence of specific electric energy consumption (A, kw. hr./kg.Nb) on temperature (B, °C) and concentration of niobium pentachloride in vapor-gaseous mixture $NbCl_5 + H_2$.
Content $NbCl_5$ (mole): 1 - 0.1, 2 - 0.15, 3 - 0.20.



Card 5/5

L 61330-65 EWT(m)/EWP(b)/EWP(t) IJP(c) JD

ACCESSION NR: AP5017469 UR/0370/65/000/003/0040/0049
669.2/8.049.6

12
B

AUTHOR: Nisel'son, L. A.; Alekseyeva, N. N.; Ivanova, R. V.

TITLE: Purification of gallium by rectification of its trichloride

SOURCE: AN SSSR. Izvestiya. Metally, no. 3, 1965, 40-49

TOPIC TAGS: gallium trichloride, aluminum trichloride, refined gallium, rectification column, simple distillation, sieve plate column, packed column

ABSTRACT: The higher chloride $GaCl_3$ is an intermediate in the production of highly pure gallium by various methods such as extraction from HCl solutions, zone refining, and simple distillation. In this connection, the authors investigated the possibility of using $GaCl_3$ as the raw material for obtaining pure gallium by means

Card 1/4

[illegible]-65

ACCESSION NR: AP5017469

refined gallium ($AlCl_3$ 0.36% by weight, $FeCl_3$ 0.44%, $PbCl_2$ 0.21%, $CuCl_2$ 0.22%, and $MgCl_2$ 0.26%) was prepared by fusion in an evacuated and soldered vial. Then one half of the mixture was subjected to simple distillation and the other, to rectification in a packed column of 20 mm diameter with a packing bed 350 mm high (glass rings ~ 4.5 mm in diameter). As was expected, rectification proved to be more effective in isolating the impurities than simple distillation. Thus, in these experiments, nearly [illegible]% of gallium trichloride (in terms of the initial charge) was obtained with a content of $Fe > 1 \cdot 10^{-4}\%$, $Pb > 4 \cdot 10^{-5}\%$, $Cu > 4 \cdot 10^{-6}\%$. The isolation of aluminum was, however, less thorough: $AlCl_3$ is a much more volatile impurity than $GaCl_3$ and therefore it is present in the very first fractions both during rectification and during distillation; at the same time, a large part of the aluminum remains in the still residue. Therefore a special series of experiments was performed to elucidate certain features of the behavior of aluminum during the distil-

$AlCl_3 + H_2O \rightarrow AlOCl + 2HCl$ (1)

Card 2/4

ACCESSION NR: AP5017469

The resulting aluminum oxychloride is nonvolatile. However, the results of the experiments with simple distillation indicate that even an excess of water does not convert all of the $AlCl_3$ to the nonvolatile form of the oxychloride. This is apparently related to the existence of a mobile equilibrium in the $GaCl_3$ melt

$$AlOCl + GaCl_3 \rightleftarrows AlCl_3 + GaOCl \qquad (2)$$

The findings on simple distillation indicate that reaction (2) is markedly shifted leftward in the direction of the formation of AlOCl. Reaction (2) accounts for the [illegible] of aluminum during the distillation and packed-column rectificashifts the equilibrium of reaction (2) in the

Card 3/4

L [illegible]

ACCESSION NR: AP5017469

which is more effectively removed from the reaction region. Thus, rectification is indeed a workable method of refining gallium. Orig. art. has: 5 figures, 6 tables, 4 formulas.

ASSOCIATION: none

SUBMITTED: 25Jul64 ENCL: 00 SUB CODE: IC, MM

NR REF SOV: 004 OTHER: 004

Card 4/4

L 01798-66 EWT(m)/EPF(n)-2/EWP(t)/EWP(b) IJP(c) JD/WW/JG

ACCESSION NR: AP5021497 UR/0370/65/000/004/0097/0104
669.2/.8.049.6.296.297 27

B

AUTHOR: Nisel'son, L. A. 44,55 (Moscow); Stolyarov, V. I. 44,55 (Moscow); Izhvanov, L. A. 44,55 (Moscow); ~~Korolev, YU. M.~~ 44,55 (Moscow)

TITLE: Separating zirconium 27 and hafnium 27 by fractionating their tetrachlorides 44,55 44,55 21

SOURCE: AN SSSR. Izvestiya. Metally, no. 4, 1965, 97-104

TOPIC TAGS: hafnium, zirconium, fractional distillation, metal purification

ABSTRACT: Mixtures of $ZrCl_4$ and $HfCl_4$ are experimentally separated by fractionation in metal columns with kilogram charges. The experimental equipment is shown in fig. 1 of the Enclosure. The results are tabulated and graphed. It was found that direct fractionation of the tetrachloride mixture is highly effective as a means for separating hafnium and zirconium. When the initial tetrachloride mixture contains 1.5-2.5% Hf, fractionation produces more than 50% Zr containing about 0.05% Hf. Up to 40% of the Hf in the original charge is concentrated in the head fractions with an average hafnium content of 20-25%. With initial hafnium contents of 16.6 and 13.5%, the maximum concentration of Hf in the head fractions of the

Card 1/3

L 01798-66

ACCESSION NR: AP5021497

distillate is 85.6 and 70.8% respectively. The experimental conditions produced a yield of 30-40 $g/cm^2 \cdot hr$. Orig. art. has: 4 figures, 5 tables.

ASSOCIATION: none

SUBMITTED: 25Jul64 ENCL: 01 SUB CODE: GC, MM

NO REF SOV: 007 OTHER: 002

Card 2/3

L 01798-66

ACCESSION NR: AP5021497

ENCLOSURE: 01

O

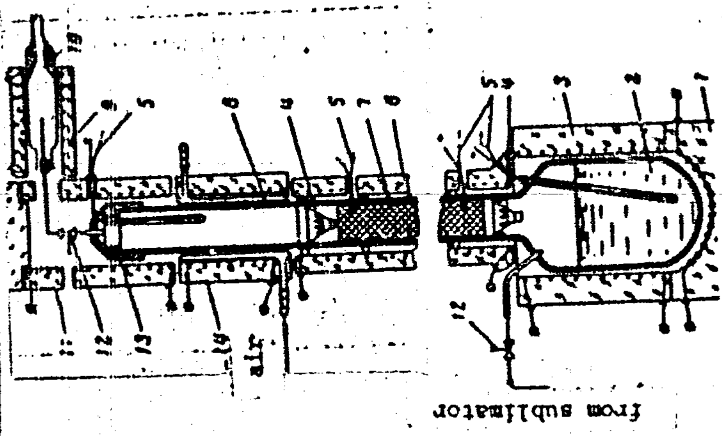


Fig. 1. Diagram of the fractionation column for separating a $ZrCl_4$-$HfCl_4$ mixture: 1--main electric heater for the still; 2--column still; 3--auxiliary electric heater for the still; 4--cone holding the packing; 5--thermocouples; 6--heat insulation for the column; 7--packing; 8--air-cooled sleeve for the fractionating column; 9--electric heater for the fraction receiver; 10--receiver for the hafnium fractions; 11--electric heater for the head section of the column; 12--needle valve; 13--head section of the fractionating column; 14--electric heater for the fractionating column

Card 3/3

PETRUSEVICH, I.V. (Moskva); NISEL'SON, L.A. (Moskva); BELYAYEV, A.I. (Moskva)

Obtaining titanium silicides by the simultaneous reduction of titanium and silicon tetrachlorides by hydrogen. Izv. AN SSSR. Met. no.6:52-57 N-D '65. (MIRA 19:1)

1. Submitted October 14, 1964.

L 31647-65

ACCESSION NR: AP5002796

ed at temperatures ranging from the melting point to 310--400C and the results are described by formulas. More exact melting points of pure MoCl and WCl were determined to be at 194.4C and 283C, respectively. Experimental results are given tables 1, 2, and 3 of the Enclosure. The data given in this study are new and not appear in the technical literature. Orig. art. has: 2 figures and 3 tables.

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut [illegible] Moscow (GIREDMET State Scientific

L 23547-65

ACCESSION NR: AP5002796 ENCLOSURE: 02

Table 2. Critical parameters and other properties of molybdenum pentachloride and tungsten hexachloride

Compound	Molecular weight, g	t_{melt}, C	t_{cr}, C	$t_{cr} - t_{melt}$, C	ρ_{cr}, g/cm^3	V_{cr}, cm^3/mol	P_{cr} (est.), atm	ρ_{melt} for liquids, g/cm^3	Constants of Van Der Waals equation: a · 10^{-6} atm · cm^3/mol	Constants of Van Der Waals equation: b, cm^3/mol
$MoCl_5$	273.24	194.4	577.0	382.6	0.34	803.8	51.8	2.198	80.00	168.3

Table 3. Viscosity of liquid molybdenum pentachloride and tungsten hexachloride

$MoCl_5$		WCl_6		$MoCl_5$		WCl_6	
t, °C	η, centipoise	t, °C	η, centipoise	t, °C	η, centipoise	t, °C	η, centipoise
210,0	0,856	285,5	1,193	270,0	0,544	342,3	0,882
221,0	0,700	290,5	1,161	280,5	0,525	351,5	0,814
230,5	0,732	308,7	1,042	311,5	0,479	370,1	0,743
240,5	0,687	309,2	1,051			385,7	0,693
253,5	0,627	320,1	0,972			400,5	0,650
264,0	0,599	333,6	0,903				

Card 5/5

L 6 EWT(m)/EWP(b)/EWP(t) [illegible] JD

ACCESSION NR: AP5008480 S/0078/65/010/003/0593/0595

16
15
B

Nisel'son, L. A.; Mogucheva, V. V.; Sokolova, T. D.

Critical parameters of phosphorus, arsenic, and antimony trichlorides

Zhurnal neorganicheskoy khimii, v. 10, no. 3, 1965, 593-595

TOPIC TAGS: antimony trichloride, arsenic trichloride, phosphorus trichloride, critical temperature, critical density, orthobaric density

ABSTRACT: This study has been carried out because the available data on the subject are disconnected and incomplete. Orthobaric density curves for $SbCl_3$, $AsCl_3$, and PCl_3 are plotted, and the critical temperatures and densities of the chlorides are determined from the density data. The experimental data are processed by the method of least squares and presented in the form of interpolated equations. Densities of the $SbCl_3$ liquid from melting point to [illegible]C and of the $AsCl_3$ and PCl_3 from 0 to 120-140C are measured with great accuracy. The results are given

~~temperatures for $SbCl_3$ and PCl_3 are also in good agreement with the available data,~~

ACCESSION NR: AP5008480

20-30C higher for $AsCl_3$. Orig. art. has 3 formulas, 2 figures, and 2

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut redkometallicheskoy promyshlennosti (State Design and Planning Scientific Research Institute of the Rare Metals Industry)

SUBMITTED: 01Oct63 ENCL: 02 SUB CODE: IC

NO REF SOV: 005 OTHER: 010

L [illegible]-65

ACCESSION NR: AP5008480

ENCLOSURE: 01

Table 1. Orthobaric densities of antimony, arsenic, and phosphorus trichlorides

SbCl₃				AsCl₃				PCl₃			
Vapor		Liquid		Vapor		Liquid		Vapor		Liquid	
Temperature, C	Density, g/cm³	Temperature, C	Density, g/cm³	Temperature, C	Density, g/cm³	Temperature, C	Density, g/cm³	Temperature, C	Density, g/cm³	Temperature, C	Density, g/cm³
182,4	0,00420	63,3 *	2,7[illegible]	166,5	0,0144	8,0*	2,1372	98,0	0,0101	-9,5*	1,6258
237,8	0,0083	78,4 *	2,6653	195,0	0,0238	32,5*	2,1344	121,6	0,0130	0,0*	1,6102
247,5	0,0115	94,4 *	2,63[illegible]	219,3	0,0332	54,8*	2,1282	125,5	0,0181	15,8*	1,5821
248,2	0,0108	123,1 *	2,2083	243,0	0,0573	73,0*	2,0474	138,8	0,0190	27,5*	1,5597
259,3	0,0140	153,5 *	2,4975	255,4	0,0603	73,5*	2,0113	144,1	0,0268	40,5*	1,5330
269,7	0,0225	182,7 *	2,4281	275,8	0,0835	78,0*	2,0155	159,3	0,0317	54,6*	1,5091
290,3	0,0242	207,7 *	2,2703	29[illegible],3	0,115	84,5*	2,0215	161,0	0,0353	66,7*	1,4850
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0,[illegible]	102,7*	1,9743	1[illegible],8	0,0593	70,3*	1,4808

ACCESSION NR: AP5008480

ENCLOSURE: 02

Table 1 contd.

313,5	0,0354	522,5	2,08	378,4	0,412	148,7	[illegible]	25,7	0,156	113,8	[illegible]
318,7	0,0419	565,0	2,04	378,5	0,454	148,8	[illegible]	26,0	0,203	160,0	1,34
314,5	0,0400	374,7	1,94	381,2	0,560	152,5	[illegible]	27,8	0,215	100,0	1,29

[illegible]	[illegible]	[illegible]	1,10			[illegible]	1,57		241,0	1,08
[illegible]	0,236					299,5	1,49		247,9	1,02
512,9	0,444					319,5	1,39		251,5	1,00
515,7	0,441					337,5	1,27		254,0	0,99
519,0	0,565					344,0	1,23		[illegible]	0,85
[illegible]	0,706					353,0	1,20		259,5	0,80
[illegible]	0,702					391,2	0,80			
[illegible]	0,810					382,5	0,58			
[illegible]	0,856									

* The accurate density measurements were obtained in a pycnometer of large volume.

[illegible] ova, I. D., Bedordinov, R. A.

TITLE: Density, viscosity, and surface tension of silicon tetrachloride and trichlorosilane

SOURCE: Zhurnal neorganicheskoy khimii, v. 10, no. 6, 1965, 1297-1299

TOPIC TAGS: silicon tetrachloride, trichlorosilane, chloride density, chloride viscosity, chloride surface tension

ABSTRACT: The article continues a series of studies on the physicochemical properties of chlorides. Silicon tetrachloride and trichlorosilane are important source materials for the production of high-purity silicon. [illegible] in the literature are contradictory. In this report, the authors present [illegible] measurements of the density, viscosity, and surface tension of $SiCl_4$ and $SiHCl_3$ between [illegible] and a temperature slightly above their normal boiling points. The chlorides studied were thoroughly purified by chemical means and by distillation. Density was measured in quartz pycnometers, viscosity in a capillary viscometer, and surface tension by the method of maximum pressure in a bubble. All the measurements were carried out in sealed devices in order

Card 1/2

[illegible]3-65

ACCESSION NR: AP5015012

exclude the adverse effect of moisture. The data obtained are tabulated and illustrated with graphs; they were also treated by the method of least squares, and are expressed in the form of exponential interpolation equations. Orig. art. has [illegible] figures and 6 tables.

ASSOCIATION: None

SUBMITTED: 03Aug63 ENCL: 00 SUB CODE: IC

NO REF SOV: 006 OTHER: 008

Card 2/2

L 58[illegible]-65 EWT(m)/EWP(t) [illegible]

ACCESSION NR: AP5018241 UR/0078/65/010/007/1516/1519
546.6[illegible]'131+546.681'131

22
B

AUTHOR: Nisel'son, L. A.; Sokolova, T. D.

TITLE: Density, viscosity, and surface tension of aluminum and gallium trichlorides

SOURCE: Zhurnal neorganicheskoy khimii, v. 10, no. 7, 1965, 1516-1519

TOPIC TAGS: aluminum chloride, gallium chloride, density, viscosity, surface tension

ABSTRACT: Pycnometric measurements of density yielded the following equations:
$\rho Al_2Cl_6 = 1.2841 - 2.32 \times 10^{-3}\Delta t - [illegible] \times 10^{-6}\Delta t^2$ g/cm^3 from t_{fus} = 192.5 to 2[illegible]6.0C, where $\Delta t = t - 192.5$C (mean square error $\Delta\rho_{sq}$ = 0.0006), and
$\rho Ga_2Cl_6 = 2.0546 - 1.985 \times 10^{-3}\Delta t - 1.64 \times 10^{-6}\Delta t^2$ g/cm^3 from t_{fus} = 78.0 to 240.0C, where $\Delta t = t - 78.0$C (mean square error $\Delta\rho_{sq}$ = 0.0013). From the peaks of orthobaric curves, the critical temperatures (t_{cr}) were found; the critical densities were also determined. From viscometric data, the following equations were derived:

Card 1/2

L 62589-65

ACCESSION NR: AP5018241

$\eta_{Al_2Cl_6}$ = 3.[illegible]02 × 10^{-1} - 2.899 × 10^{-3} Δt + 1.232 × 10^{-5} Δt^2 poise from t_{fus} = 192.5 to 276.0C, where $\Delta t = t - 192.5C$ (mean square error $\Delta\eta_{sq} = 0.003$), and

$\eta_{Ga_2Cl_6} = 1.768 - 2.22 \times 10^{-7} \Delta t + 1.47 \times 10^{-6} \Delta t^2 - 3.74 \times 10^{-7} \Delta t^3$ poise from t_{fus} = 78.0 to 247.0C, where $\Delta t = t - 78.0$ (mean square error $\Delta\eta_{sq} = 0.013$). The data obtained for the surface tension can be represented by the following equations:

$\sigma_{Al_2Cl_6} = 9.77 - 7.33 \times 10^{-2} \Delta t$ dyne/cm from t_{fus} = 192.5 to 285C, where $\Delta t = t - 192.5C$ (mean square error $\Delta\sigma_{sq} = 0.1$), and

$\sigma_{Ga_2Cl_6} = 25.9 - 1.0 \times 10^{-1} \Delta t + 8.7 \times 10^{-3} \Delta t^2$ dyne/cm from t_{fus} = 78.0 to 300.0C, where $\Delta t = t - 78.0C$ (mean square error $\Delta\sigma_{sq} = 0.3$). Orig. art. has: 3 figures, 6 formulas and 4 tables.

ASSOCIATION: None

SUBMITTED: 01Feb64 ENCL: 00 SUB CODE: TC

NO REF SOV: 007 OTHER: 004

Card 2/2

ACCESSION NR: [illegible]

31/B

AUTHOR: Nisel'son, L. A.; Lapidus, I. I.

TITLE: Liquid-vapor equilibrium in systems formed by silicon tetrachloride and silicane trichloride with dibutyl ether and some additives

SOURCE: Zhurnal fizicheskoy khimii, v. 39, no. 1, 1965, 161-165

TOPIC TAGS: equilibrium condition, silicon tetrachloride, silicane trichloride, dibutyl ether

21 27

ABSTRACT: Experiments were performed on equilibria between liquids and vapors in systems formed by $SiCl_4$ and $SiHCl_3$ with dibutyl ether and some added chlorides. Graphs show the dependence of the logarithms of vapor pressures on the inverse absolute temperature in mixtures of $SiCl_4$ and $SiHCl_3$ with dibutyl ether, liquid-vapor phase equilibria in $SiCl_4$ and $SiHCl_3$ with dibutyl ether at 760 mm (with a negative deviation from Raoult's law), and also the dependence between the coefficient of activity and the composition of the liquid phase. Tables present the coefficients of log p = A - B/T equation for $SiCl_4$- and $SiHCl_3$ - dibutyl ether ... also the relative volatility in $SiCl_4$ and $SiHCl_3$ systems with added